Notebook Series -- Notebooks by Edison
Notebook, N-17-02-14

This notebook was used by Edison in February and March 1917 to record research performed for the U.S. Navy during World War I. This work was probably done in connection with Edison's attempts at aiding submarine detection. The notes describe a series of experiments, numbered from 1 to 51, aimed at amplifying sound. Included are descriptions of the equipment used and of various arrangements of apparatus at the laboratory. Most of the experiments involve attempts to amplify and measure the sound of a phonograph playing a continuous note within a soundproof box. The box was equipped with different transmitting devices, most of which employed audions in circuits with induction coils and condensers. The transmitters were connected to telephone receivers. Edison's notes indicate that he was assisted at times by Miller Reese Hutchison, Absalom M. Kennedy, and other laboratory employees. Notes by Kennedy on related experiments can be found in N-Undated.6 and N-17-03-06, Notebooks by Other Experimenters—Navy and World War I Experiments. The pages are unnumbered. Approximately 40 pages have been used.

Feby 14 -

#30 phone facing 2 flat Bell Receivers in series - 1/16 away from grid -

also same in Multiple -

Series is louder than Multiple -

Series 50% louder than single - Hutch

2nd Expt

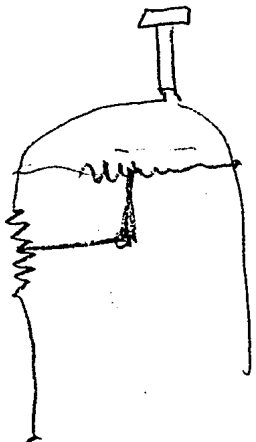
One receiver 1 ft from grid

Kennedy hears at 30 notch

3rd

ditto same as 2 but 6 ft from grid 28 - This is queer, probably spots on record weak & loud with Tuning Record 435 vibrations second go to 8 only Kennedy

Measuring box



Shunts line +

adds Res also

Numbers are miles of 19 wires

2-14/17

4th Experiment

With turned record 6 ft. 2 in
Series, 12 points –

J

5th Experiment

When in series 6 ft away
but backing each other
get 6 points = Only – probably
magnetism unequal as was
should not hear any thing –

6th –

2 = Now Multiple arc – got 10 points

7th

with 3 in series get 14 points

8th — 2/14-17

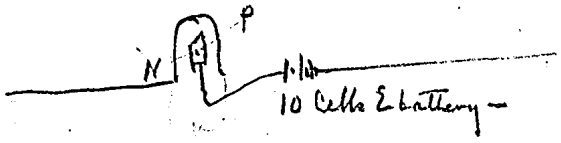
3 in series — 6 ft away

put in E Valve lamp in Line -

Cant hear anything.

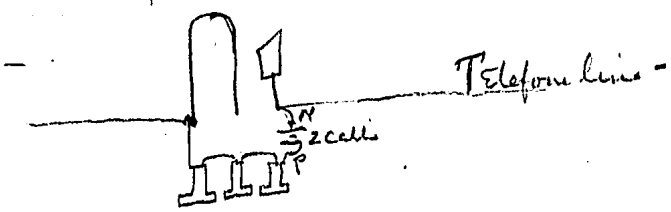
9th.

3 in series 6 ft away #30 phone
pierman's room — tuning Reserve



Cant hear anything

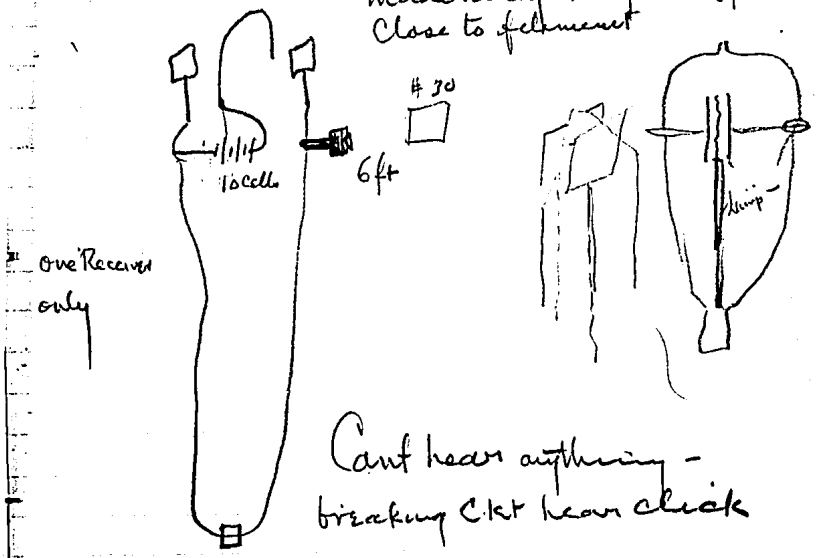
10 2-14-17



hear to 8 - but this is going without Valve

11

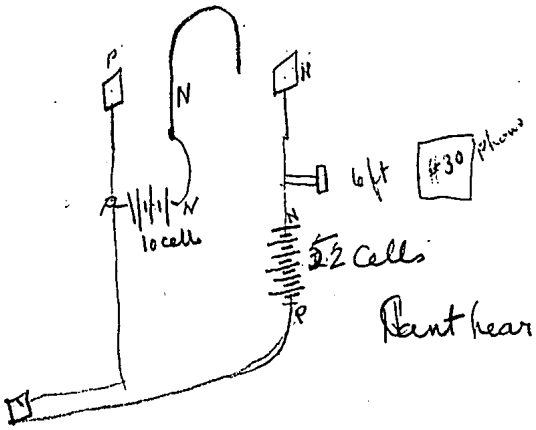
This is a new lamp Howell made today - large with platina Close to filament



Cant hear anything - breaking Ckt hear click

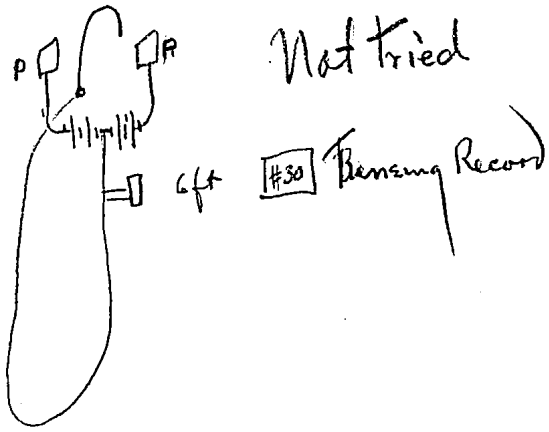
Feby 14/17

#12



Dont hear anything

No 13

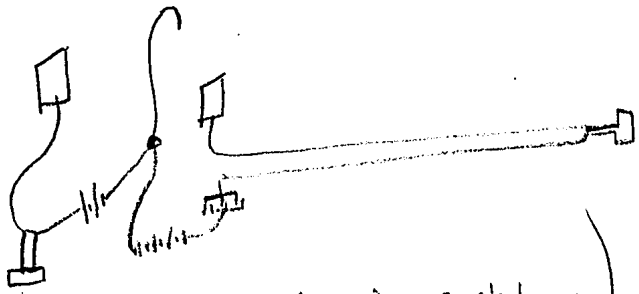


Not tried

Foxboro Co - 50 Church
at NY -

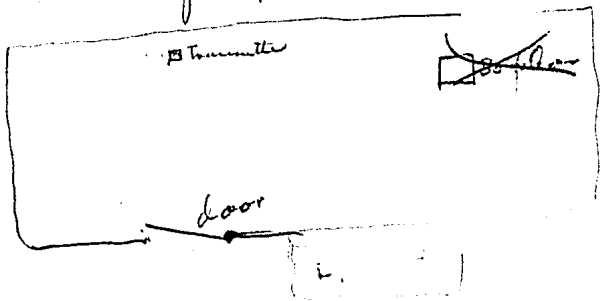
gives correct horizontal
progression of angle of
wings are not more
than 14° - from horizontal
would be slight
Error of up to 20 deg

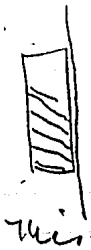
#14



get click on Opening - not heard

Equipt with angle groove Ball
Opener.



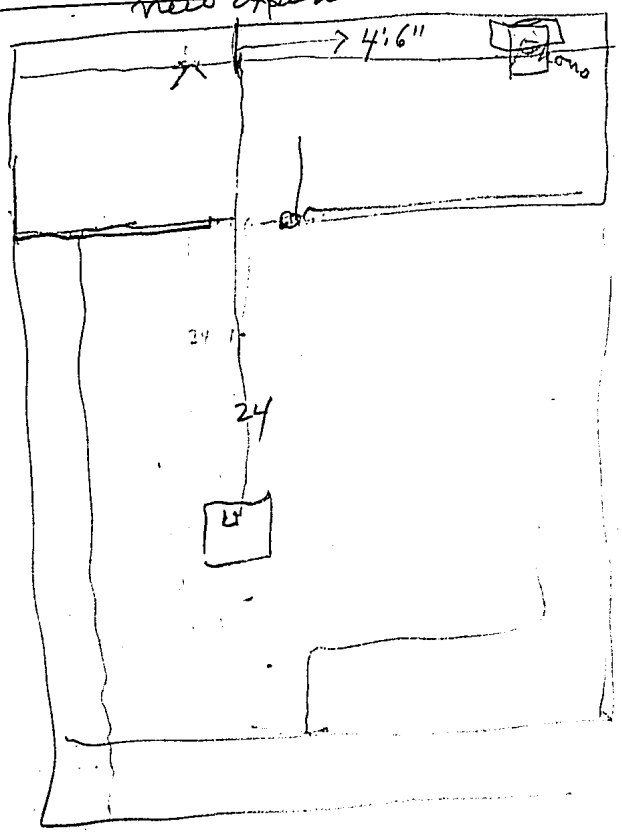


Rhom
at Receiver End - heard 16 on box
door 2" Opening -

2/18—17

½" opening heard nothing
with door 1" opening heard at 10

new Experiment



Phonograph playing humming record

1st Expt Door wide open
Limit on box (14) — 3 cells on
High Res coil on transmitter-turning
on line —

2nd Expt

Door 1/2 closed
Stops at 8.

Door 2" opening | Stops at 4 on box

While it is Sunday & everything
closed & working on top of Cross
yet Kennedy is challenged by
confused noises coming from
without some probably coming
for 1/2 mile today the air
being filled
I have just finished

Used in 1st t.
A Bell telefone induction coil

Res primary ———
" Secondary ———

Transmitter in Secondary with
3 cells =
Will mark Coil # 1

Coil No 2. ½" spark coil —

a sound proof Box -
one box within another
with 1½ Cow hair between
& will try best experiment
listening in this booth,

3rd Experiment now in booth.

Door 2" opening varies from
6 to 8 points on Box

4th Experiment same as 3
but door 1" wide opening —
get it only at intervals, other
sound thru telefone interferes

5th
Same as 4th but with # 2 Coil
triple battery - 2 points on box

#3 Coil-

Res primary _____
" Secondary _____

#4 Coil -

Res Primary _____
" Secondary _____

#5 Coil
Primary
Secondary

6th Expt Coil #3.

Get 12 points on box
If conditions not changed this is good Coil for the transmitter or receiver

7th Expt - No 4 Coil get only audible noise no note from tuning record,

8th Expt #5 Coil - no recording

9th Expt 6 Coil just hear it at 2

706 Coil
Primary
Secondary

#7 - West Elec circular Coil -
get it 24 points
Think there is very high
Secondary Best yet,

Res Primary
Secondary

8 Western Elec

9 Western Elec

10th Expt. 7 Coil hear at 24 point
on box - best yet BOSS!

11th Expt #8 Coil Western Elec
hear at 16 point.

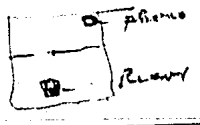
12 #9 - 6th point.

13th Expt 10 hear on 2

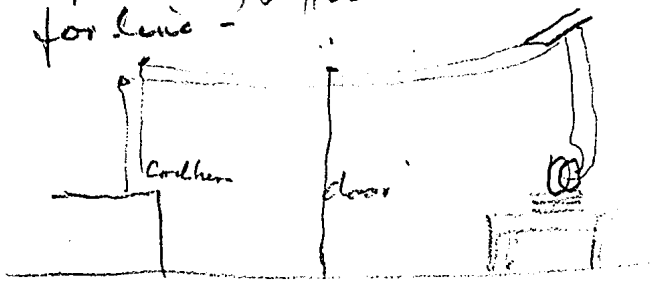
14th = Booth not perfect Firestone + 25 ft away was heard in booth & interfered with test -
Well put Cow bar outside -
tested #7 only got 12, while
~~after~~ we were talking

15th Questions gone, quiet in room
#7 Coil - get, found slight frying
think this due to some gas or
air waves we can't hear
Tried it again but fries like a loose
Contact = OK now was a bad
Contact, get 23, This corresponds
to ~~[illegible]~~ 10th Experiment where was
get 24

16 - #7 Coil but 4 cells battery
now - having added
one more cell - still
using turning record on
30 ohms & same conditions
Door 1" Open
get, 25 but shaky



heavy light wires laying on floor was connected to microphones probably jars went to it
Have now #36 Cotton Covered for line -



These fine wire rigidly suspended above to microphone with prevent jars and wire being transmitted

An important thing about very sensitive microphones is that great precautions must be taken to get a holding plate so no vibrations long throughout can reach it.

NOTE

7 Coil

7 Coil -

17 Experiment instead 4 cells used 3 got 10 points.
Kennedy is bothered by sounds coming from window —
Closed them yesterday etc which interferes in hearing the Continuous note from the phonograph —

18th Experiment same conditions as 17 but 5 cells Alkline Cells put in — got 23 points —
another reading 3 minutes later 18 points —
Strange the 5 cells don't do better than 4 —

7 Coil

19= We now try 2 receivers to the Ear instead of 1 got 18 points no difference Receivers in Series —

20= We now connect receivers in multiple arc. got 20.

21= Talking 12 ft away from booth standing up in my ordinary tone of voice Kennedy can hear it but not when sitting at my desk = Well improve booth —

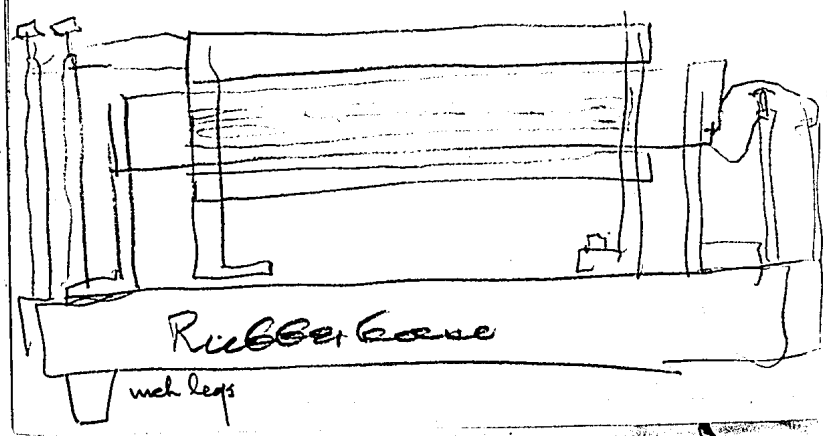
Wattled from Bunnell — Johns

Primaries

2 Each	1 - 2 - 3 - 5 + 7
2 of	10 - 15 25

Secondaries —

1	2800
2	2000
2	1500
1	1000
2	750
1	500
1	300
2	200
2	100
2	50



Measured resolution of primary + secondary

	Primary	Secondy	got points on 6 of
No 1	.51	93	—
2	.3	4500	2
3	.45"	158	12
4	.42	—	0
5	.38	33	0
6	.063	151	2
7	34.5	228	24
8	56.5	177	16
9	41.6	40.6	6
10	136	14290	2
11	.906	39.7	
12	.88	38.	

Expt 22 - #11 Coil -

Expt 23 12 Coil -

Expmt 24

Have changed things to the Gallery

Main line to Booth on glass insulators —

Booth coated outside & in with 1½ Cow hair, double door Kennedy exports OK ~~but~~ Except very loudest sounds

The audion or Gallery on insulators —

The Microfone is in a case surrounded with ½" Cow hair & suspended by bifilar wires to bellows above resting on one inch of Cow hair —

Soft Rubber legs

The phonogh is in a chest
lined with Cocohair 1½
has lid which closes
tight on to Cocohair.
Has opening in front
with Camera Iris Shutter

first test 25" = still get a
Continuous note about 120 sec
phono going or clapped
Thes probably from light,
line Have ~~[illegible]~~ Condition
in + Bell Rear as transmitter
Iris Shutter wide open +
phone 18" from shutter
got 30 pounds, Changed to
2 ft. got at 30 yet, dia ½ open
get it at 20 pounds - Bell receiver

6 ft away Lais wide open
28 points.

Lais. 2 position	26 pounds on box
4 "	22
6 "	22
8 "	20
10	18
12	18
14	16
16*	18

* 16 is as close shut as possible

Lais closed to only 16 inch —
~~[illegible]~~ & stuffing of
full of Coir hair hear at 12 pounds
on box

We now connect the Mero
in next room, to the phone; which is
plugged - using Anderson on line —
No induction coil — Door
wide open get 30 points but lots
other sounds — ~~[illegible]~~ using 4 cells
Kennedy left the induction coil
out by mistake, the heavy Current

May have burned the Micro Calls
We now put in #7 Coil secondary
to Micro & primary to Line —
get 30 points with door one
inch open which is best yet,
get 30 points with door 1/2" open
with door closed get 30 still
Kennedy with ear near
Micro can just hear phone
in other room —
What we want is for Micro
to detect it when the ear hears
nothing. —
We now put 2 boxes in
series get 42 points —

In all cases there seems to be some frying at times strong = This must be got out to avoid it all –

This is the point now to work on

Phenomenon – when in bath we touch ~~the~~ one of the binding posts on the Box phone rings –

Must get this out –

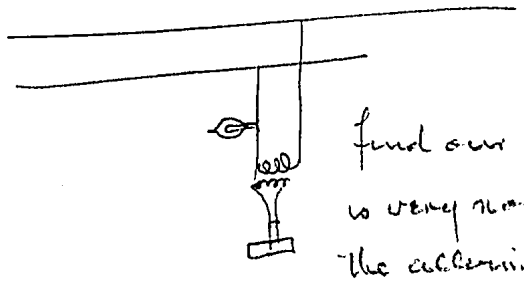
I have just found frying condemning due to jars from building given by Street Cars very off & other things – The bifilar suspension is no laid Micro on the Holder on 2 thicknesses Cardboard hair – These reduces

frying — Then put a round
itself on 3 layers hair
then wear better ~~[illegible]~~ —
I myself can hear the
fry zero under these
conditions —

If main line is opened
we get it — if both ends
receiving phone is disconnected
don't hear it —
If everything connected
+ transmitter cut
out still get it
if transmitter cut
in 40% louder

This refers to steamy, hissy sounds — not the 120 sec Dynamo sounds which is all preceding —

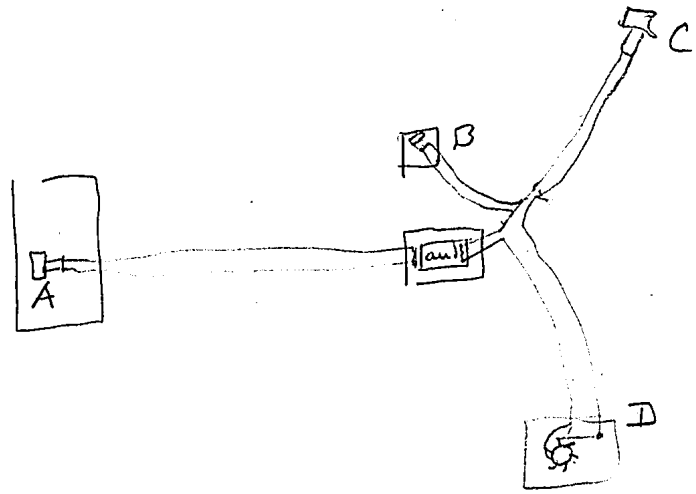
get it even when audion disconnected —



find our light line is very noisy here

The alternating current note strong — This note we hear in Experimental circuit line — 2 lamps

But we have freq in addition so far Cant find it.



A open
B open
C Closed
D Running - hear it medium

1

A Open
B open
C closed
D stopped, closed — but Only Dynamic -

2

A open
B. Closed
C open
D. Running - get Louder + intermittent chirp -

A open
B closed
C open
D stopped + closed only Dynamo noise

A open –
B closed
C open
D running – stopped Chirrup but got moderate noise

B on
D on running – } no connection with Audion –
occasional click – very faint –
no dynamo sounds –
This would show no Thermo from wheel –

+ lines connected to output Coils
A open
B closed
C open
D Running
Audion Taken off insulators put on Table, Battery still insulated –
– no chirrup, medium noise –

A open
B open
C closed
D Running
medium noise – no chirrup –

A open
C closed
B open
D Running medium current no chirrup

A open
C open
B closed
D Running - medium current no chirrup.

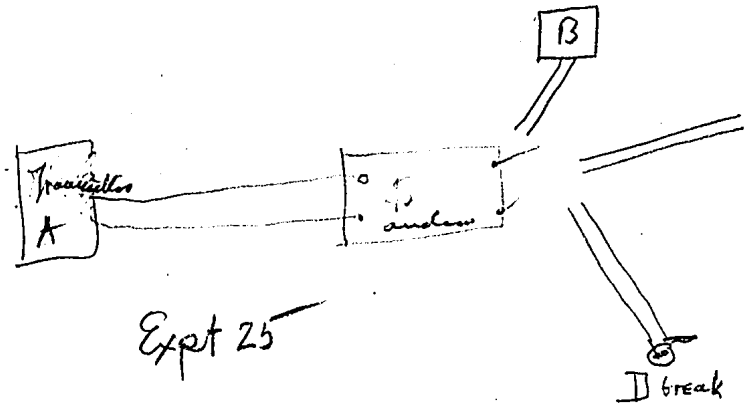
Audion + batteries on table - not connected

A closed telephone out,
C open
B closed
D Running - medium sound no chirrup

A closed telephone in
C open
B closed
D Running medium sound no chirrup.

A closed with telefone in
B closed
C open Listening ground off
D Running - Chirps Bad

A closed telephone in
B closed
C open
D Running Listening ground in no chirp
but medium sound - with another,
ground on No 1 plug of 2nd condenser
or corresponding one on # 1 condenser
medium chirp - but 15
milamp shows on galvanometer
when both grounded on -



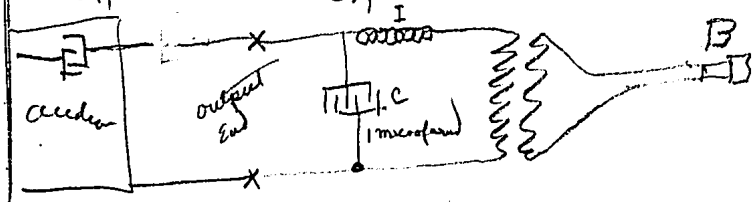
Expt 25

A connected
B " "

Box 38 phonograph playing to Bell Receiver — Noisy - dynamo only

Expt 26

Experiment with impedance I Condenser C



phonograph playing

I has 177 ohms Rio - 6000 ohms impedance

Box 16 pounds — very quiet

Expmnt 27

Same condition as Expmnt 26
Except impedance reduced from
6000 to 2000, Condenser same (14)
1 microfarad

Box - 26 -

Expt 28 -

Same as 26 but 2000 impedance
+ 1/10 microfarad Condenser -

Box shows - 32

Expt 29 - We keep conditions of
28 same, stop the phonograph + cut in
II break wheel -

The wheel sound is reduced
20% - or if medium was
100 this is 80%

Experiment 39 same as 28
but with break wheel in + changed
from 1/10 MF to 1/2 microfarad.
This is now 50%.

Experiment 40 –
Through running wheel out.
2000 impedence 1/2 microfarad
Box – 28.

Experiment 41 –
Through running break wheel
out, 1/2 microfarad
Impedence – reduced to
1000 impedence =
Box 28 –

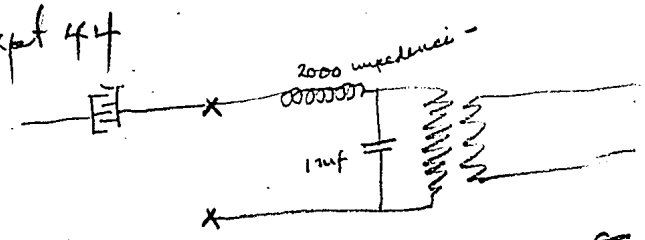
Expt 42 -

phonograph running wheel out
No impedance / microfrad
working —
Box - 38 @ 40 -

Expmt 43 —

We now try break wheel ckt
in with 42 Conditions -
35 @ 40% - of medium —

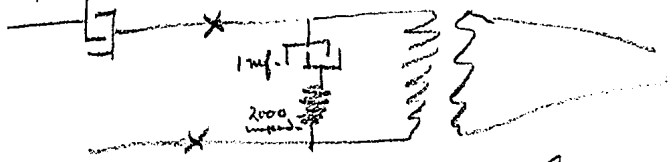
Expt 44



phonograph running break wheel out.
Box 30 - little noisy

Expt 45 We now test break wheel noise
60% -

Expt 46 -



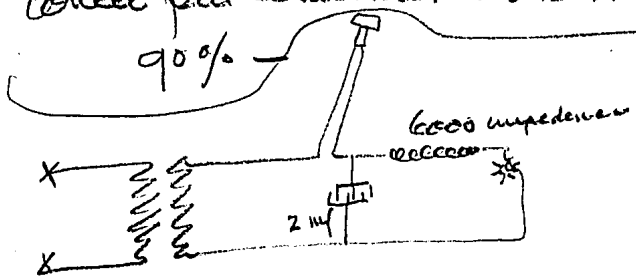
We test break wheel on this -
70% -

Expt 47
Regular at both Ends, break wheel in Gut shunted by 1 mfarad Condenser -
Very bad noise - over 130%

48

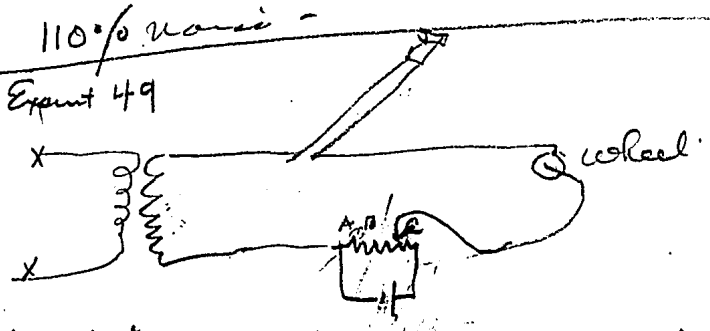
We now instead of shunting wheel put Condenser in series –

90% –



110% noise –

Expmt 49

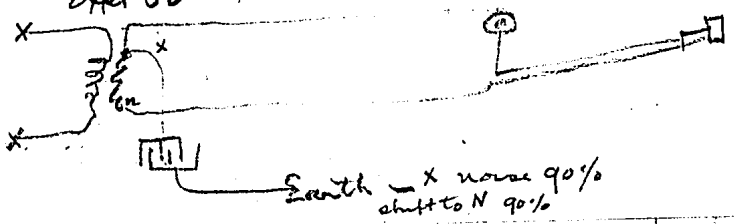


Bell phone cut out other room –

gets louder as go from A toward C

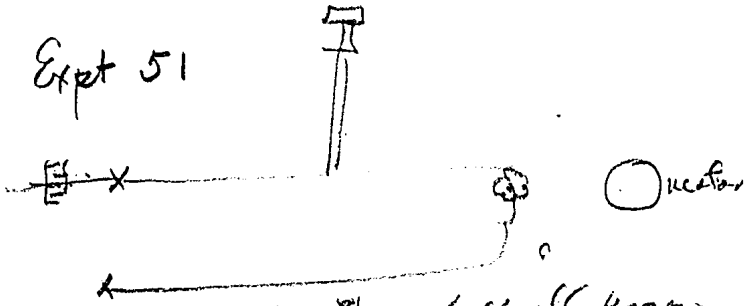
Reversing Bat just the same –

Expt 50



Earth – X noise 90%
shift to N 90%

Expt 51



Close current + Throw belt off keep Motor running - perhaps leaves induced in by Motor into closed current.

No sound of Motor stopped or started - get Bypranid sounds - as usual -

March 9 – Eve

Old 1st Microfone – on table in Mdnes room – on lead – Through in Cocoban box – 5/8 hole door closed – Burnal input output Coils on – 3 cells – get 30 on box – Input Coil primary 11 ohms – –

We exceeded at 250 primary for 11 ohm primary on input Coil –

1st trial dont get as loud, no wes come in somewhere – 2nd trial dont get anything peculiarly bad Contact, something wrong

We put the 11 ohm primary back – something wrong

We Evidently short ckted the 3 cells Thear microfone & burned it –